REMARKS:

REQUEST FOR CONTINUED EXAMINATION

A Request for Continued Examination (RCE) is filed with this amendment. As such, the Applicant submits that entry of the amendment is proper under 37 CFR 1.114.

INTERVIEW SUMMARY

In an interview with attorney of record Joshua D. Isenberg and attorney Hao Y. Tung on January 12, 2006, the Examiner discussed proposed amendments to the claims including amendments set forth above. The interview included a discussion of the above amendments to claim **2**. The Examiner indicated that entry of these amendments would require a request for continued examination (RCE). Although no agreement was reached, the Examiner did indicate that the above amendment to claim **2** would probably distinguish over the art of record including US Patents 6, 716,693, 5,614,273, 6,875,667 and 3,923,556.

AMENDMENTS TO THE CLAIMS

To expedite prosecution, the Applicants have amended claims **2** to improve readability and to recite that that the adjacent turns of the coils define a gap that allows for flow between adjacent turns of the coils and that at least one of the substrates is a flexible, elongate member. The Applicants submit that no new matter has been entered with these amendments. New claims **35-48** have been added to provide a desired scope of claim protection. Claim **22** has been amended to improve readability. The withdrawn claims **6-13** and **24-34** are canceled.

CLAIM REJECTIONS - 35 USC 102

Chan

Claim **2** was rejected under 35 USC 102(e) as being as being anticipated by US Patent 6,716,693 to Chan et al. (hereinafter Chan).

The Applicant respectfully overcomes the rejection. Claim **2** has been amended to recite that the adjacent turns of the coils do not touch one another and define a gap that allows for flow between adjacent turns of the coils. Support can be found with reference to Figures 2H and 4 in the application as filed. The Applicant submits that Chan neither teaches nor suggests any such feature. Instead Chan et al. teach forming "a planar spiral structure, consisting of a long micro-channel 52 in an insulating layer 50." See col. 7, lines, 44-48 and FIG. 5A of Chan. As can be seen from FIG. 5A, the spaces between the turns of the "coil" formed by the micro-channel 52

are occupied by the insulating layer 50. Thus, Chan does not teach "a gap that allows for flow between adjacent turns of the coils" as set forth in claim 2 as it presently stands. As such, Chan does not anticipate claim 2.

CLAIM REJECTIONS - 35 USC 103

Chan in view of Marsh

Claims 3 and 5 were rejected under 35 USC 103(a) as being obvious over Chan as applied to claims 1 and 2 above in further view of US Patent 6, 380,983 to Marsh (hereinafter Marsh).

The Applicants respectfully traverse the rejection. As set forth above, the Applicants submit that, for the reasons discussed above, Chan is devoid of any teaching or suggestion of a gap that allows for flow between adjacent turns of the coils as set forth in claim 2. Claims 3 and 5 depend, either directly or indirectly from claim 2 and recite additional features therefor. The Examiner has pointed to no teaching or suggestion within Marsh of coiling one or more substrates. As such, neither Chan, nor Marsh, nor any combination of Chan and Marsh teaches or suggests all the features of claims 3 and 5 and a prima facie case of obviousness is not present.

Goedicke in view of Iszczukiewicz and further view of Iizuka

Claims 2-5 and 14-21 were rejected under 35 USC 103(a) as being obvious over US Patent 5,614,273 to Goedicke in view of US Patent 3,923,556 to Iszczukiewicz in further view of US Patent 6,875,667 to Iizuka et al. In making the rejection it is stated that Goedicke discloses that it is desirable to coat a steel sheet with titanium oxide and that Iszczukiewicz discloses a method for treating a steel sheet by coiling it with a spacer placed between the coils and that Iszczukiewicz further discloses that the treatment may involve modifying the chemical composition of the strip or applying materials to the surface of the strip using gas phase treatment. It is admitted that this combination does not teach using ALD to deposit the titanium oxide. It is argued that Iizuka et al teaches that ALD using $TiCl_4$ and water is a conventional way to form a TiO_2 film. It is concluded that it would be obvious to modify Goedicke in view of Iszczukiewicz by using an ALD process as taught by Iizuka with a reasonable expectation of successfully forming the TiO_2 layer.

The Applicants respectfully traverse the rejection on the grounds that the cited references are not combinable since the proposed modification cannot change the principle of operation of a

reference. See MPEP 2143.01(VI). **If the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims prima facie obvious.** Goedicke teaches TiO_2 deposition using plasma-activated electron beam vaporization in a roll-to-roll system (see abstract and FIG. 3). Goedicke teaches plasma-activated electron beam vaporization is desirable since it can achieve a high coating rate (see col. 3, lines 56-67). The Examiner is proposing that the roll-to-roll system of Goedicke be removed and replaced with a coil system as taught by Iszczukiewicz. The Examiner also proposes removing the plasma-activated electron beam vaporization system of Goedicke and replacing it with an ALD system of much lower deposition rate, which operates in a substantially different manner. It is further noted that Iizuka is directed to formation of capacitors having TiO_2 layers on the order of 1-15 nm thick (see col. 8, lines 36-37) or 10-30 nm thick (see col. 1, lines 50-55). The Applicants submit that the proposed changes are so significant that Applicants fail to see the motivation for one in the art to make these changes as they alter the principle of operation of the reference being modified.

The Applicants also respectfully traverse the rejection on the grounds that the Examiner has failed to set forth any reasons for combining Goedicke, Iszczukiewicz and Iizuka to arrive at the invention recited in the present claims. The only text in the Office Action that appears to come close is the Examiner's belief that there may be a reasonable expectation of success to combine the references (page 8, lines 17-19). **However, this is not a motivation to combine the references, absent hindsight teachings from the current application.**

Therefore, the Examiner has not established a prima facie case of obviousness since obviousness cannot be established absent some teaching, suggestion or incentive supporting the combination (ACS Hospital Systems, Inc. v. Montefiore Hospital, 732 F. 2d 1572, 1577, 221 USPQ 929, 933 (Fed. Cir. 1984)). Absent such a showing in the prior art, the Examiner has impermissibly used the Applicants' teaching to hunt through the prior art for the claimed elements and combine them as claimed (see In re Vaeck, 947 F. 2d 488, 20 USPQ 2d 1438 (Fed. Cir. 1991); In re Bond, 910 F. 2d 831, 15 USPQ 2d 1566 (Fed. Cir. 1990); In re Laskowski, 871 F. 2d 115, 117, 10 USPQ 2d 1397, 1398 (Fed. Cir. 1989)). The use of hindsight is never permissible to establish obviousness. Furthermore, traditional uses of ALD such as that shown in Iisuka where ALD is used on a rigid silicon, semiconductor substrate to form capacitors or the like (as shown in Figure 1 of Iisuka)

appears to lead those of skill the art away from using the process on a flexible **conductive** metal substrate as shown in Iszczukiewicz.

Furthermore, even if, *arguendo*, Goedicke, Iszczukiewicz and Iizuka could be properly combined, the time scale of the reactions applied in the prior art, while improving throughput relative to similar batch processing of planar substrates, do not result in the efficiency improvement made possible by this invention relative to prior art with ALD and as claimed in claims 37 and 39. In particular, ALD is an inherently low throughput process, with typically about one-third of an atomic monolayer coverage per deposition cycle, and prior literature states that this process is inherently low-throughput, and in fact teaches away from ALD as a high-throughput process. See U.S. Patent 6,838,114 ("The ***low throughput*** of existing ***ALD*** techniques limits the utility of the technology in its current state because ***ALD*** may be a bottleneck in the overall manufacturing process.") or U.S. 6,861,094 ("The ***low throughput*** of existing ***ALD*** techniques limits the utility of this technology in its current state because ***ALD*** may be a bottleneck in the fab."). In contrast, this invention allows an effective throughput proportional to the surface area being batch processed, which is in turn related to the wrap density of the roll. Placing a densely wrapped roll in a batch ALD system can increase effective throughput by as much as about 1,000 or greater. This is far greater than the increase in processing made possible by wrapped roll using the chemical processing described in the known art such as the annealing process of Iszczukiewicz (where the gain in throughput by going from a planar substrate to a coiled substrate is not as great as that for ALD since the ratio of effective throughput for ALD [coiled vs planar] is higher than annealing [coiled vs planar] since ALD is inherently a slower process and planar processing via annealing is much faster). It is a counterintuitive result that ALD can be made to have a high effective throughput even with a sub-monolayer deposition cycle.

NEW CLAIMS 35-43

The Applicant submits that newly added claims 35-37 are allowable over the prior art of record by virtue of their dependence from claims 2. The Applicants further submit that Iszczukiewicz does not teach or suggest "a continuous layer on at least one side of the substrate from one adjacent turn to another" as recited in claim 35 since the vertical spacers 13 and horizontal spacers 14 would prevent formation of a continuous layer on either the front or back side.

Support can be found with reference to Figure 2H. Claims **36** and **37** also recite features not shown or suggested with an ALD process. Support for claim **36** and **37** can be found in Figure 2H and on page 12, line 30 of the application, respectively.

Claims **38-48** are also allowable as they recite using ALD to provide an effective throughput not shown or suggested by the cited art. Support for claims **38** and **42-45** can be found on page 12 where the cross-sectional area of the hexagonal chamber may be calculated to be about 20.8 m^2 (hexagon of 3m per side minus hexagon of 1 m per side) and that the invention may have up to 2000 coils (e.g. 1-2000 coils) in the chamber, each with an average area of about 2m X 6 X 2m (24 m^2). Hence, the ratio of coiled substrate surface area to planar substrate surface area can be as high as 2309:1. Claim **38** recites that the ratio is at least 2:1 and within the range of coils supported by the disclosure. Support can also be found in Figure 2H (showing two full turns of the substrate), where the substrate may be coiled to have a surface area greater than any cross-sectional surface area of the chamber. Claims **42-45** recite ratios within the range of coils disclosed. Support for claims **39, 40,** and **41** may be found on page 12, lines 30-31, page 13, lines 1-2 , Figure 2H, and Figure 4 of the application. Support for claims **46-47** can be found with reference to Figures 1B and 2H. Support for claim **48** can be found at page 10, line 26 of the application as filed.

ALLOWABLE SUBJECT MATTER

The Applicant appreciates the Examiner's indication of allowable subject matter in claims **22** and **23**. These claims have been rewritten in independent form as suggested by the Examiner.

CONCLUSION:

For the reasons set forth above, the Applicants submit that all claims are allowable over the cited art and define an invention suitable for patent protection. The Applicants therefore respectfully request that the Examiner enter the amendment, reconsider the application, and issue a Notice of Allowance in the next Office Action.

Respectfully submitted,

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